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THE GREAT SNOWSTORM, FEBRUARY 28TH TO MARCH 2ND.

THE fall of snow which took place on Sunday, February 28th, in many parts of England and Wales, continued in most districts without intermission until late on Monday evening, when there was a cessation more or less general in the South of England, and in most parts of the Midlands and in Wales. But the energy of the snow-charged depression was only removed further north, and during Monday a storm of greatly-intensified severity visited the northern counties of England and nearly the whole of Scotland, extending across the St. George's Channel to the eastern points of the Irish coast. Snow fell continuously for from 24 to 30 hours, and on Tuesday, March 2nd, was still falling over an area bounded by Northumberland on the south and Perthshire on the north, and continued to do so until midnight. It was accompanied by a high wind and a heavy sea on the East Coast, and on the principal railways the snow was drifted into huge wreaths, which entirely blocked the main lines of exposed districts, and filled the cuttings to a great depth. From all points accounts were received of passenger trains buried for hours in these drifts, and of great sufferings and inconvenience to the travellers; while mail communication between London and many of the northern cities was interrupted for nearly 24 hours.

The storm, though it spent its fury over a very wide area of country, was most violent in Scotland and in the belt of land between Newcastle-upon-Tyne and Berwick. The interruption to railway traffic was serious in 1875, but it was chiefly caused by heavy local falls of snow of short duration, or by the floods which followed the thaws. In 1878-9 there was also considerable annoyance experienced by occasional stoppages of railway communication. The winter of that year closely resembled the present winter in its long-continued low temperature, and for 90 years before 1878 there had been only four winters matching it for constant low temperature and long continued frost. Our present season of hard weather is in striking contrast to it, however, in one very important particular. The train stoppages on two or three lines in that year occurred in December,

when some locomotives ran overhead into deep drifts, and one dashed hissing into a railway station through a lake four feet deep. But the storm of this year burst forth on the 1st of March. In its violence, and the high wind which made it so disastrous, it has had no equal since 1853, as it has in many respects exceeded in its hardships the terrible storm of March, 1867, when highways were blocked up, sheep overblown, and mountain drifts covered the country.

The closest parallel was the January snowstorm of 1881, of which full details were given in this Magazine, when, for instance, no fewer than 51 trains were snowed up on the lines of the Great Western Company. The differences are chiefly two—that was in January, this in March; that was in the south of England, this chiefly in the border counties and the south of Scotland.

An Edinburgh paper gives the following notes on the distribution of pressure at the time of the recent storm, and as they have been printed in *Nature* as an original communication, it is not difficult to guess by whom they were written :—

For a fortnight previous to this memorable storm the weather maps of Europe presented several noteworthy features. Eastern and northern Europe was the theatre of a widely-extended anti-cyclone, slowly shifting its position from day to day, and sending out from its central region winds in all directions, differing much in their climatic qualities; whilst, on the other hand, western and south-western Europe was marked by an atmospheric pressure persistently much lower, with an unwonted absence of anything approaching a cyclone, which is usually a characteristic feature of the weather at this time of the year.

The anti-cyclone from February 15th to 19th had its centre about Moscow, during which time pressure rose till on the latter date the barometer at 32° and sea-level stood as high as 30·965 in., or nearly 31 in.; and at the same time temperature steadily fell, a temperature of —7°·6, or fully 7° below zero, being recorded at Moscow on the morning of the 19th. The anti-cyclone thereafter advanced northward and westward to the White Sea and the Gulf of Bothnia, a pressure of 30·961 in. being recorded at Haparanda on the 22nd, and of 30 922 in. at Uleaborg in Lapland on the 24th. Thereafter it advanced southward to Stockholm with a pressure of 30·603 in. on the 28th, to Riga with a pressure of 30·742 in. on March 1st, and to Gothland with a pressure of 30·300 in. on the morning of the storm. The central regions of this anti-cyclone were meanwhile marked by unusually low temperatures, the lowest being —16°·8 on the 23rd, and —18°·8 on the 24th, at Archangel, and —15°·5 on the following morning at Haparanda; these temperatures being about 30° below the average of the season at these places.

The weather maps of Europe show a noteworthy change to have already set in on the morning of the last of February, when the curvings of the isobaric lines, or lines of equal atmospheric pressure, pointed to the appearance of a cyclone to the north-east of the White Sea, and to another cyclone advancing from the south-west on the British Isles. Between these two cyclones, it will be observed, lay the anti-cyclone or region of high atmospheric pressure. On March 2nd the cyclones, with their systems of low pressures, travelled, the

more northern one somewhat to westward, and the more southerly one to eastward; and these respective movements were continued on the following day. In the meantime, the anti-cyclone between the two cyclones greatly shrunk in breadth, and by the morning of the storm lay as a narrow tongue of high pressure westwards over Scandinavia, and, meteorologically speaking unusually close on to the cyclone, whose centre was now about the Humber. It resulted necessarily from this high pressure immediately to the northward that the storm passed across the British Islands with uncommon slowness in its easterly course, thus prolonging its continuance in Great Britain; and that the steepest gradients were formed in the north-east quarter of the cyclone—a rather unusual feature in the storms of north-western Europe, thus exposing North Britain to one of the very worst easterly gales of recent years.

Similarly, our great Edinburgh hurricane of January 24th, 1868, occurred with a region of high atmospheric pressure immediately to the eastward, while to the east of this high pressure another cyclone raged at the same time. In this case, however, the cyclone, anti-cyclone, and cyclone lay in a series from east to west, and as the combined system advanced very slowly to eastward, this great hurricane blew persistently from the south over the whole country for many hours. On Tuesday last, on the other hand, the cyclone, anti-cyclone, and cyclone lay from S.S.W. to N.N.E., and as the centre of the more southerly cyclone crossed England from westward to the Humber, the whole of North Britain was on the arctic side of the storm, which therefore blew with a chill and a force which are happily of rare occurrence in our Scottish climate. As regards the amount and remarkable character of the snowfall, though science as yet can throw little light on the subject, it may be suggested that it was in some way connected with the remarkable weather described above, which overspread eastern and northern Europe during the fortnight preceding the storm.

We now proceed to give a very brief abstract of the reports which we have at present received. We do not pledge ourselves to the perfect geographical sequence of every detail, in fact, that is practically unattainable; but we aim at brevity, and the records are roughly in the order of latitude—from S. to N.

The most southerly place from which we have heard of actual stoppage of traffic is Bedford, but that is hardly a place where it could be very serious.

The Birmingham Tram-Car service was stopped.

The Cambrian Railway was blocked between Oswestry and Welshpool.

The Bala and Festiniog line was blocked at Trawsfynydd.

The Chester and Holyhead line was heavily over-blown near Penmaenmawr, but by the employment of a very large number of men all serious interruption was avoided.

The line was blocked at Corwen.

Llanberis Station was "snowed up."

The Isle of Man line was blocked.

In the towns of Lytham and Blackpool business was almost stopped.

The only part of the London & North-Western Railway which

was blocked, was between Preston and Lancaster, and that seems to have been only for a short time.

The Midland Railway had a serious block on the Settle and Carlisle line, near Dent, which was reported as impassable from the 1st to the morning of the 4th.

The Furness Railway, for the first time during 30 years, had one train snowed up.

The North Eastern Railway Company were the heaviest sufferers —in fact, the Directors are reported to estimate their loss at £100,000—£30,000 for labour and damages, and £70,000 for lost traffic, but we think that both items are beyond the truth. However, even if reduced to half, and judging from their ordinary traffic returns that does not seem unreasonable—we still have one snowstorm costing one railway company £50,000. We are told that besides the great block on their main line, of which we have more to say, there were blocks on the Malton and Scarborough at Seamer, on the Whitby line at Lofthouse and Saltburn, on the Filey branch at Hunmanby, on the old Stockton and Darlington system at Barnard Castle, and at Kirkby Stephen.

But the worst trouble was in the neighbourhood of Morpeth in Northumberland, where the main line of the North Eastern, over which runs that which we believe to be the finest train service in the world, the Great Northern to Edinburgh, was wholly blocked for a period generally reported as 60 hours, but which we think was really rather over 48 hours. There were blocks both South and North of Morpeth, in fact, one report states that between Newcastle and Berwick this company had 30 trains fast in the snow. None seem to have been able to move much on the 2nd, but on the 3rd there was improvement, and one line at any rate was rendered passable. The following is a condensed account of the fate of one of these trains. A train with two engines, nine carriages, one Pullman car, and four fish waggons, left Edinburgh at 10.50 p.m. on the 1st, got on tolerably to Berwick, but finally stuck in a drift about one mile S. of Acklington Station, between Alnwick and Morpeth at 4.45 a.m. on the 2nd, towards night of the 2nd four engines came and tried to pull them out, but could not, as the couplings gave way, but eventually some carriages were brought alongside and the passengers were offered the choice of returning to Acklington Station or remaining in the carriages. As food had been sent and there was a fire in the Pullman car most of the passengers remained in the train, which was eventually pulled through to Alnwick on the night of March 3rd.

As further evidence of the severity of the snow in the Morpeth district it may be mentioned that even as late as the night of the 5th, or according to another account the 6th, the Rothbury branch of the Northumberland Central line was blocked at Ewesley, eight miles W.N.W. of Morpeth.

We now pass into Scotland, where generally the trouble is confined chiefly to some of the South Eastern counties and to the Highland

line. But this time it was different, the Highland line did not suffer at all seriously, but the Caledonian and the North British railway were greatly disorganized—the latter company consider it the worst storm for 20 years. The North British lines were blocked at Jedburgh, Polton, Rosslyn, North Berwick, Haddington, Blackhall, Shotts, and Crofthead. The Kinross line was blocked till 9 p.m. on 3rd, and one train buried. On the Dunse and Reston line two trains with more than ninety passengers stuck fast. The train which left Galashiels at 10 p.m. on 2nd, stuck all night near St. Boswells. The train which left Boarhills for Anstruther on the morning of the 2nd, was on the 3rd still buried near Crail. A goods train which left Bathgate at 6 p.m. on 2nd, stuck at Westcraigs. The 6.40 p.m. (on 2nd) passenger train from Edinburgh to Coatbridge stuck at Armadale, and two engines sent to fetch it back also stuck fast. The 7.45 a.m. (on 3rd) train from Edinburgh also failed to get beyond Armadale, and no train passed from Bathgate to Morningside between the 2nd and 4th. Most of these blocks were removed on 3rd, but the main line between Innerwick and Berwick, and also the Glencorse branch were not clear on the 4th, and the Dolphinton branch of the Edinburgh and Galashiels line was still blocked on the 6th.

The Caledonian Railway fared much better—their Addiewell branch was blocked and one train buried; there was a serious block with four trains buried between Montrose and Arbroath; the Alyth line was blocked until the 3rd. A train was also buried near Forfar Junction on the Dundee and Forfar direct line.

The only block that we have heard of on the Highland line was one train buried at Dalwhinnie—but we think that that may be regarded as almost an annual occurrence.

There was a heavy fall of snow in the N.E. of Ireland, but we have no details.

We shall, of course, have much fuller information as to the depth of the snow when our correspondents' returns come in at the end of the month, but we give a few estimates without suggesting whether they are right or wrong.

Dalry	6 inches	Paisley..	14 inches.
Hamilton ...	12 ,,	Hawick	18 ,,
Jedburgh ...	14 ,,		

To this we may add that on March 4th there were taken out of Edinburgh 1434 cart loads of snow.

ROYAL METEOROLOGICAL SOCIETY.

The usual monthly meeting of this Society was held on Wednesday evening, Feb. 17th, at the Institution of Civil Engineers, Mr. W. Ellis, F.R.A.S., President, in the Chair.

Mr. G. Buchanan, M. Inst. C.E., Captain G. H. Leggett, Dr. H. C. Taylor, J.P. and Mr. J. Tolson were balloted for and duly elected Fellows of the Society.

The following papers were read :—

(1.) "General Remarks on the naming of Clouds," by Capt. H. Toynbee, F.R.Met.Soc. The author considers it important to keep to Luke Howard's nomenclature, leaving it to the observers to express by an additional word any peculiarity they notice in a particular cloud.

(2.) and (3.) "On the Thickness of Shower Clouds," and "On the Formation of Rain, Hail, and Snow," by Mr. A. W. Clayden, M.A., F.G.S. From some measurements of the angular elevation of clouds and of the position of their shadow, made by the author during the summer of 1885, he has come to the conclusion that clouds of less than 2,000 feet in thickness are not often accompanied by rain; and if they are it is only very gentle, consisting of minute drops. With a thickness of between 2,000 and 4,000 ft. the size of the drops is moderate. As the thickness gets greater, the size of the drops increases, and at the same time their temperature becomes lower, until, when the thickness is upwards of 6,000 ft. hail is produced. The author points out that all observations tend to show that, except under quite abnormal conditions, the temperature of the atmosphere falls as the height above sea-level increases; and that there seems no reason whatever for assuming that the law does not apply to that portion of the atmosphere which forms a cloud. Hence if a drop were to be formed at or near the upper surface of a cloud, it would fall into a region saturated with vapour at a temperature above its own. The result would be further condensation producing a larger drop; and this process would continue until it left the cloud. If its temperature is below the dew point of the air it falls through, condensation will continue until it reaches the ground. However, it is obvious that this subsequent gain cannot bear any very large proportion to the growth while falling through the saturated cloud, from which the conclusion follows that the size of the drop must increase with the thickness of the cloud. The author suggests that condensation begins on the upper surface of the cloud by the cooling of some of the liquid cloud particles. If this particle is cold enough it will solidify, and snow will be formed. Should it not be quite cold enough to solidify at once, owing to its minuteness, but remain still below the freezing point, hail is formed. Finally, if the temperature is not low enough for either snow or hail, rain is produced.

(4.) "On Three Years' Work by the 'Chrono-barometer' and

'Chrono-thermometer,' 1882–84," by Mr. W. F. Stanley, F.R.Met.Soc., The chrono-barometer is a clock that counts the oscillations of a pendulum formed by a suspended barometer. The upper chamber of the pendulum is a cylinder of an inch or more in diameter. By change of atmospheric pressure the mercury in the pendulum is displaced from the bottom to the top and *vice versâ*. The rate of the clock is accelerated or retarded in proportion to the displacement of the mercury. The chrono-thermometer is a similar clock to the above, and the pendulum is also a barometer, but instead of the lower chamber being exposed to pressure the whole tube is enclosed in a second hermetically sealed tube containing air. Atmospheric pressure being thus excluded, the expansion of the included air by heat alone, forces the mercury up into the vacuum chamber, and alters the period of oscillation of the pendulum. Therefore every vibration of each pendulum is an observation respectively of pressure or of temperature, and a subsequent reading of the dial gives the mean of as many observations as there have been beats of the pendulum say 86,000 per diem.

DEW.

A remarkable coincidence is to be found in the publication of Mr. Aitken's paper in our last number, and in the appearance of the following paragraph in the *Journal of Horticulture* issued on the following day, and reporting the proceedings at the Royal Horticultural Society on February 9th. The similarity of Mr. Smee's investigations to those of Mr. Aitken is noteworthy :—

LEAVES AND DEW.—Mr. Smee read an interesting communication on some observations he had made during nineteen days upon the relative amount of dew deposited on leaves of different plants last summer. He observed the Quince, Syringa, Brussels Sprouts, Peach, Rose, Mulberry, Evening Primrose, and Dahlia, at seven in the evening and again at nine in the morning. It appeared that the leaves of the Quince and Mulberry are always the last to be coated with dew, and are never very wet at any time. Dahlias and Brussels Sprouts become coated with dew sooner than any other plants ; while in the former, drops of dew hang from the points of every leaf. The leaves of the Peach, Rose, and Evening Primrose are never so wet as those of the Dahlia, but always had more moisture deposited on them than had those of the Quince and Mulberry. Mr. Smee also exhibited a table giving the atmospheric conditions in his garden on the days of his observations. The plants were all similarly situated as to exposure, and were, as far as practicable, growing in close proximity to one another.

REVIEW.

limatologie de la Ville de Fécamp, ses rapports avec la Météorologie du Département de la Seine Inférieure. Par CHARLES et EUGENE MARCHAND. Fécamp, 1886. 8vo, autographed.

ALTHOUGH this work, like several that we have been favoured with from France, is unpublished, we do not like it to pass unnoticed; and as a copy has been presented by M. Marchand to the Royal Meteorological Society it is generally accessible.

It may, by the bye, be worth while to call attention to the mode of production; it resembles the result of the glycerine transfer process for which there was a temporary rage in England about three or four years since, but which Englishmen have never succeeded in working so uniformly and so clearly as our French friends—even the almost microscopic writing of M. Marchand becomes, with adequate magnifying power, perfectly legible, and the neatness alike of diagrams, tables, and the 100 pages of text, leaves nothing to be desired. It certainly looks like a solution of the problem of £. s. d. which keeps much Meteorology in MS.

M. Marchand began his observations at Fécamp in 1853, the results of the first ten years were published by La Société Nationale Havraise d'Etudes diverses in 1864, and of the next 10 years in 1874. This latter summary was reviewed in the *Meteorological Magazine* for 1875 (Vol. X.) pp. 56 and 71. The book now before us deals with the third decade, in which M. Marchand was greatly helped by his deceased son, M. Charles Marchand.

Although running on very similar lines to those of the previous series it differs from them by the greater use made of diagrams, some of them very ingenious, and also by the incorporation of results from nearly 30 stations organized in the Department of la Seine Inférieure by the Ponts et Chaussées.

Referring to our previous notice for details we must pass the present work very briefly.

The mean temperature $\frac{(M + m)}{2}$ is 50°·2; absolute max. 92°·7, July 22, 1869; absolute min. 3°·9, Jan. 22, 1881; the mean sea level barometric pressure at noon, reduced to 32° for 30 years, 29·997 in. M. Marchand has collected all the noon readings of the barometer and sorted from them two groups with the following results:—

Days when it was low water about noon ...	29·928 in.
,, ,, high ,, ,, ...	29·895 in.

which he quotes as indicative of a lunar tide.

As regards state of sky, clouds, &c., M. Marchand has designed no fewer than 25 symbols, the whole of which we cannot discuss here, but we may mention that he makes the mean amount of cloud 6·8. In this section M. Marchand refers to his researches on

Photantitupimétrie, but as we reported fully upon them in an article entitled Sunlight,* we need not do so again.

The prevailing direction of wind both at Fécamp and throughout the department is discussed most carefully, but we have only space to state that it is very nearly due West at Fécamp, but markedly different at the various stations in the Department. The frontispiece shows clearly that many of these anomalies are due to the stations being in valleys along which the wind is obliged to blow.

The rainfall during the 30 years has been

Wettest year (1881)	52·49 in.	152.
Mean	34·50 in.	or 100.
Driest year (1864)	24·06 in.	70.

M. Marchand then works up a very large collection of rainfall obervations made in the Department of la Seine Inférieure and gives them in a new and good form. He has taken a map of the Department, ruled it with squares about 3 miles × 3 miles, marked upon it the actually observed values and then filled into every square the value which he considers to be nearest the truth. He gives the maximum to the vicinity of Havre (36 inches), and the mininum to the extreme S.E. of his map towards Beauvais (22 inches).

In concluding sections the authors discuss the frequency, localities and damages of hail and of thunder storms, and also the frequency with which storm warnings are justified by subsequent events.

Our readers can now judge for themselves as to the interest of this work.

CUTTINGS.

THE RECENT SEVERE WEATHER IN AMERICA.

The late January storm is thus alluded to in the *American Cultivator* (Albany, New York) of January 21 :—"This storm in its extent, in the amount of snow which fell, in the average degree of cold, and the velocity of the wind, was a phenomenal winter tempest. Railroad traffic from the Atlantic to the eastern side of the Rocky Mountains was interrupted, scores of trains having been snowed in. The intense cold weather lasted until the morning of the 15th, when a general rise in temperature began. On the 12th, the thermometer registered at Bridgton, Main, 40° below zero ; at Peterboro, New Hampshire, —32° ; at Waterbury, Connecticut, —20° ; at Wichendon, Massachusetts, —25° ; at Lexington, Kentucky, —14°. In this city, on the 14th, it fell to 26° below the lowest point on that day recorded at any signal office in the country. Along the coasts scores of vessels suffered. Some were lost, and others were driven ashore. How many persons have been drowned cannot yet be ascertained. Hundreds of head of live stock perished from the cold. Over 250 hogs at the East Liberty (Pennsylvania) stock yards, and more than 500 head of cattle near Dodge City, Kansas, were frozen to death. Intelligence from the cattle regions of Texas reached us, January 14, saying that cattle were dying in great numbers. Their carcases, it was stated, could be seen, far and near, strewing

* *Met. Mag.*, Vol. XI., 1876, p. 1.

the prairies. The loss of the live-stock industry of that State, it is said, will be enormous. Advices from the western and south-western wheat belt state that the snowstorm with the recent severe cold has protected the wheat from all harm. At the south, the coldest weather known in many years prevailed, frost extending, it is believed, to almost the extreme southern end of Florida. There is little doubt that the entire orange crop remaining on the trees in the peninsula is frozen, and that most of the young trees, except those protected, are killed. It is estimated that 500,000 boxes of oranges, worth £200,000, were destroyed."

NEW SOUTH WALES IN DRY SEASONS.

That the squatting interest is greatly affected by dry seasons scarcely needs demonstrating, because where there is no rain, there is no grass. That New South Wales should have lost thirteen million sheep in three years from droughts is a very serious matter. It may, however, be mentioned that these droughts are by no means unprecedented, as some very interesting information recently furnished to Mr. H. C. Russell shows that some pioneer squatters have known the Darling quite as low as it was last year, if not lower. In 1839 this river was merely a chain of waterholes, and again, ten years afterwards, it was very little better. In 1851 the bed of the river was so dry that grass had grown in it, and, in fact, it was the only feed the horses could get. In 1863 the river was only a chain of waterholes from Bourke to Wentworth. In 1865, again, the cattle were fed in the bed of the river. In 1868 the water was low, and in 1870 the great wet season began. It was this wet season that raised so many false hopes. The country was overstocked —not for the good seasons but for the average seasons, and still more so for the bad seasons—and, as there were no railways to the far west, there was no means of shifting the sheep as the supply of feed fell off. Mr. Russell, however, thinks that there is a tendency for the seasons to repeat themselves every 19 years, and if this calculation should prove to be anywhere near the truth, it will enable squatters to adapt themselves to these changes. At present, all that Mr. Russell can say is that the condition of things in 1862 re-appeared in 1881, that of 1863 in 1882, and that of 1865 in 1884. The squatters are therefore hopeful that the great flood of 1867 will be reproduced in 1886. Meanwhile, it is clear that those who occupy the western half of the Colony have to encounter some very bad seasons intermixed with very good seasons. One of three things must be done : either the average quantity of stock must be kept down to the limit that is manageable in dry years, or artificial food must be provided, or there must be railway facilities furnished to carry the stock to other parts of the Colony where there is grass, or to some abattoirs where they can be killed and turned into tinned or frozen meat. The present system of stocking up in the good seasons, and then seeing half the stock die during the drought, is one that is not only wasteful but cruel.—New South Wales Correspondent in *The Colonies*, February 19th, 1886.

NATIVE AUSTRALIANS AS RAIN PREDICTORS.

Civilised people should not be altogether above taking a hint from "savages." It is reported from Northern Australia that the "blacks" have been recently quitting the low lands and making for the high grounds in anticipation of a heavy and prolonged rainfall, and in support of their claim to be considered good "clerks of the weather" it is stated that they foretold the

late drought, and came down to the valleys, so as to be near the water, long before the white settlers foresaw any signs of a dry spell.—*The Colonies*, February 19th.

ANTS AS RAIN PREDICTORS.

A gentleman residing a few miles from Rockhampton has called our attention (says the *Bulletin*) to a circumstance which seems to foretell an abundant supply of rain at an early date. The white ants, he states, have commenced to build those curious elevated dwellings which serve them as places of refuge during wet weather, and the country in our informant's neighbourhood is dotted over with the structures in every direction. Personal observation for a number of years has convinced him that this sign is one which may be relied upon, and it is a noteworthy fact that it is more than two years since these industrious little workers have been seen to take such a precaution for their own safety. Previous to the recent showers they remained perfectly quiescent, and their present activity may, therefore, presage a much more liberal downpour than any we have had for a long time. We can only trust that our informant's deduction may prove correct. On the Range it has also been observed that the white ants have been unusually active, and are working on the surface of the ground mound making.—*Brisbane Courier* (Queensland), November 9th, 1885.

THE BIELA METEORS—UNIVERSAL TIME.

To the Editor of the Meteorological Magazine.

SIR,—I take the liberty of calling your attention to an oversight in the December number of the *Meteorological Magazine*, p. 165.

In converting time at Georgetown, D.C., to Greenwich time, the fact has been overlooked that the time now used in the United States is not in general *true local* time, but that of the 75th, 90th, 105th and 120th meridians, West of Greenwich. Georgetown uses the 75th meridian, and is therefore just five hours slow of Greenwich.—Yours respectfully,

GEO. E. CURTIS.

Washington, D.C., February 18th, 1886.

[We are much obliged by the receipt of the above correction, and we profit by the re-opening of the subject to offer two remarks.

The illustration which the above error, and also the difficulty which we have ourselves experienced in ascertaining what time is employed at other stations, afford an example of the harm done by the rejection of the proposed "new time." We adhere to every word of the article on that subject in the *Met. Mag.* for January, 1885.

Secondly. It seems to us that as regards these meteors *true* local time at each place is the fact required; the meteors became visible owing to the earth turning from the sun, and therefore darkness coming on, and also to each part of the earth being successively turned towards that part of space where the stream was thickest. This, however, is an astronomical rather than a meteorological subject, and we therefore leave it. ED.]

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, AUG., 1885.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute.				Average.				Absolute.		TotalRain.		Aver.
	Maximum.		Minimum.										
	Temp.	Date.	Temp.	Date.	Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	Cloud.
	°		°		°	°	°	0–100	°	°	inches		
England, London	79·3	17	43·3	14	69·2	51·0	49·5	72	93·2	36·7	·85	12	6·1
Malta	103·9		71·9	18	92·0	76·0	70·5	66	150·7	...	·35	1	1·5
Cape of Good Hope	72·2	3	36·0	10	62·4	47·3	...	...	...	...	4·24	10	6·1
Mauritius	77·2	27	59·8	19	74·8	65·4	60·2	73	127·6	47·0	2·76	19	5·3
Calcutta	89·5	12	75·7	24	85·9	77·7	77·8	89	154·7	74·9	26·50	28	9·2
Bombay	87·2	2	75·0	18	84·0	76·9	75·5	85	143·2	73·1	25·42	31	8·7
Ceylon, Colombo	88·0	30	71·2	14	86·5	77·7	73·7	76	146·0	64·4	2·66	14	5·5
Melbourne	77·0	20	31·7	1	59·7	44·2	39·9	65	127·3	22·5	1·56	10	6·0
Adelaide	74·3	18	38·0	24	62·5	47·7	43·7	66	131·9	30·9	2·34	19	5·2
Wellington	61·1	19	35·0	2*a*	54·5	42·4	43·8	85	118·0	30·0	2·82	17	4·3
Auckland	63·5	17	39·0	4	57·2	45·2	43·8	76	123·0	30·0	2·72	16	6·3
Jamaica, Kingston	92 5	13	71·4	7	89·3	73·8	73·0	75	...	...	·84	...	5·0
Barbados	84·0	var.	71·0	13	83·0	73·0	76·6	90	144·0	...	6·22	21	5·0
Toronto	83·1	1	43·2	28	71·1	55·1	56·0	75	...	38·2	3·91	14	6·2
New Brunswick, Fredericton	84·7	13	39·0	30	74·4	51·4	54·5	74	...	...	4·66	12	4·8
Manitoba, Winnipeg	81·2	15	30·5	24	70·8	47·6	52·3	79	...	...	1·94	13	5·4
British Columbia, Victoria	76·0	12	44·0	15	68·4	48·0	...	...	...	...	·02	1	...

a And 6, 11, 12.

REMARKS, AUGUST, 1885.

MALTA.—Mean temp. 83°·1; mean hourly velocity of wind 7·6 miles; temp. exceeded 100° on 3rd and 8th; sea temp. rose to 85° and afterwards fell to 82°. TS on 16th.
J. SCOLES.

Mauritius.—Rainfall 0·96 in., and mean temp. 0°·7 above average; mean hourly velocity of wind 11·3 miles, extremes 26·8 miles on 31st and 1·9 mile on 13th and 28th; prevailing direction of wind E.S.E. L on 5th, a very rare occurrence in August.
C. MELDRUM, F.R.S.

Melbourne.—Mean temp. of air 1°·6 above, and of dew-point 2°·2 below, average; rainfall 0·33 in., mean amount of cloud 0·2, and mean humidity and pressure slightly below their respective averages; prevailing winds N. and N.W., strong on 7 days, heavy dew on 4 days, hoar frost on 5; fog on 1st, L on 20th and 27th.
R. L. J. ELLERY, F.R.S.

Adelaide.—Mean temp. 1°·0 above, but mean diurnal range nearly 2°·0 below the average for 28 years. A remarkable wind squall occurred on 14th, the wind travelling 18 miles in 8 minutes.
W. E. COOKE.

Wellington.—Fine from 8th to 12th, showery and squally from 2nd to 7th and 13th to 16th, remainder of the month fine with showery intervals; prevailing winds N.W. and S.E.; rainfall 2·51 in. below, and mean temp. 0°·5 above average. A rather sharp shock of earthquake on 5th.
R. B. GORE.

Auckland.—On the whole a fine month; rainfall considerably and mean temp. slightly below the average.
T. F. CHEESEMAN.

JAMAICA.—Over the island generally the long-continued drought gave place in August to average rains.
MAXWELL HALL.

BARBADOS.—Rainfall 25 per cent. below, and mean temp. (77°·2) slightly above the average; pressure unsteady; prevailing wind N.E.; mean hourly velocity 10·4 miles, 23 per cent. above the average, extremes 14·7 miles and 5·7 miles. T on 13th, 17th, and 28th.
R. BOWIE WALCOTT.

SUPPLEMENTARY TABLE OF RAINFALL, FEBRUARY, 1886.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger	·47	XI.	Castle Malgwyn	2·02
,,	Margate, Birchington...	·69	,,	Rhayader, Nantgwillt..	2·43
,,	Littlehampton	·55	,,	Carno, Tybrith	1·63
,,	Hailsham	·38	,,	Corwen, Rhug	·90
,,	I. of W., St. Lawrence.	·72	,,	Port Madoc	3·34
,,	Alton, Ashdell.....	·42	,,	I. of Man, Douglas	2·09
III.	Winslow, Addington ...	·63	XII.	Stoneykirk, Ardwell Ho.	2·01
,,	Oxford, Magdalen Col...	·68	,,	Melrose, Abbey Gate ...	1·29
,,	Northampton	·51	XIII.	N. Esk Res. [Penicuick]	1·55
,,	Cambridge, Beech Ho...	·20	XIV.	Ballantrae, Glendrishaig	2·55
,,	Wisbech, Bank House..	·12	,,	Glasgow, Queen's Park.	1·75
IV.	Southend	·36	XV.	Islay, Gruinart School..	2·60
,,	Harlow, Sheering	·18	XVI.	St. Andrews, Pilmour Cot	1·23
,,	Rendlesham Hall	·29	,,	Balquhidder, Stronvar..	3·32
,,	Diss	·28	,,	Dunkeld, Inver Braan..	1·49
,,	Swaffham	·39	,,	Dalnaspidal H.R.S. ...	2·32
V.	Salisbury, Alderbury...	·82	XVII.	Keith H.R.S.	·68
,,	Warminster	·89	,,	Forres H.R.S.	·92
,,	Calne, Compton Bassett	·88	XVIII.	Strome Ferry H.R.S....	3·26
,,	Ashburton, Holne Vic..	2·85	,,	Tain, Springfield.....	1·24
,,	Holsworthy, Clawton...	1·03	,,	Loch Shiel, Glenaladale	4·85
,,	Hatherleigh, Winsford.	...	,,	S. Uist. Ardkenneth ...	2·76
,,	Lynmouth, Glenthorne.	·49	,,	Invergarry	2·87
,,	Probus, Lamellyn	2·42	XIX.	Lairg H.R.S.	·75?
,,	Wincanton, Stowell Rec.	·68	,,	Forsinard H.R.S.	1·20
,,	Taunton.....	·90	,,	Watten H.R.S.	1·40
,,	Wells, Westbury.....	·59	XX.	Dunmanway, Coolkelure	4·83
VI.	Bristol, Clifton	·82	,,	Fermoy, Gas Works ...	2·33
,,	Ross	1·22	,,	Tralee, Castlemorris ...	2·77
,,	Wem, Sansaw Hall.....	·73	,,	Tipperary, Henry Street	3·04
,,	Cheadle, The Heath Ho.	·88	,,	Newcastle West	2·33
,,	Worcester, Diglis Lock	1·29	,,	Miltown Malbay.....	2·98
,,	Coventry, Coundon	·86	,,	Gorey, Courtown House	3·61
VII.	Melton, Coston	·25	XXI.	Navan, Balrath	1·52
,,	Ketton Hall [Stamford]	·30	,,	Mullingar, Belvedere ...	2·52
,,	Horncastle, Bucknall ...	·46	,,	Athlone, Twyford	2·92
,,	Mansfield, St. John's St	·62	,,	Galway, Queen's Col....	2·65
VIII.	Macclesfield, The Park.	·68	XXII.	Clifden, Kylemore	5·26
,,	Walton-on-the-Hill.....	1·12	,,	Crossmolina, Enniscoe..	3·15
,,	Lancaster, South Road.	1·30	,,	Collooney, Markree Obs.	2·74
,,	Broughton-in-Furness ..	2·31	,,	Carrick-on-Shannon ...	2·95
IX.	Wakefield, Stanley Vic.	·39	XXIII.	Rockcorry.....	..
,,	Ripon, Mickley	·88	,,	Warrenpoint	3·49
,,	Scarborough.....	1·03	,,	Newtownards	1·39
,,	East Layton [Darlington]	1·63	,,	Belfast, New Barnsley..	2·83
,,	Middleton, Mickleton ..	·90	,,	Cushendun	2·36
X.	Haltwhistle, Unthank..	·98	,,	Bushmills	...
,,	Shap, Copy Hill	1·70	,,	Stewartstown	2·64
XI.	Llanfrechfa Grange	1·53	,,	Buncrana	3·52
,,	Llandovery	1·69			

FEBRUARY, 1886.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1870–9	Greatest Fall in 24 hours. Dpth	Greatest Fall in 24 hours. Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg	Max. Date	Min. Deg.	Min. Date	No. of Nights below 32°. In shade.	No. of Nights below 32°. On grass.
			inches	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	·63	— 1·01	·30	2	8	47·7	13	19·4	10	18	26
II.		Maidstone (Hunton Court)...	·38	— 1·24	·13	3	5	...	...	...	...	...	...
,,		Strathfield Turgiss	·60	— 1·15	·27	3	7	50·0	13	18·0	10	21	26
III.		Hitchin	·33	— 1·27	·11	14	8	44·0	13	21·0	8*a*	27	...
,,		Banbury	·66	— 1·18	·17	28	9	48·0	14	22·0	10	24	...
IV.		Bury St. Edmunds (Culford)	·24	— 1·53	·06	14	9	45·0	13 *b*	16·0	9	27	...
,,		Norwich (Cossey)	·33	— 1·42	·10	14	11	45·0	13	19·0	10	25	...
V.		Weymouth (Langton Herring)	·86	...	·50	28	7	49·0	13	26·0	10 *c*	14	...
,,		Barnstaple	1·32	— 1·87	·70	28	8	50·0	13 *b*	26·0	10	...	...
,,		Bodmin	1·98	— 2·89	·65	13	12	47·0	12	27·0	5 *d*	13	18
VI.		Stroud (Upfield)	·69	— 1·56	·21	28	9	47·0	13	23·0	6	22	...
,,		ChurchStretton (Woolstaston)	·69	— 1·81	·18	15	10	47·0	11	22·0	24	22	26
,,		Tenbury (Orleton)	1·25	— 1·22	·45	28	8	48·8	12	21·3	15	22	25
VII.		Leicester	·31	...	·10	15	7	48·5	13	24·5	7	19	27
,,		Boston	·11	— 1·67	·05	14	4	47·0	13	25·0	7 *e*	23	...
,,		Grimsby (Killingholme).....	·67	— 1·13	·27	1	14	45·0	13	25·0	24	16	...
,,		Hesley Hall [Tickhill].....	·56	...	·22	19	12	48·0	13	23·0	27	...	...
VIII.		Manchester (Ardwick).....	·77	— 1·42	·22	13	10	48·0	13	27·0	5 *c*	11	...
IX.		Wetherby (Ribston Hall) ..	1·00	— 1·15	·28	2	8	...	...	...	...	...	...
,,		Skipton (Arncliffe)	1·12	— 3·52	·27	13	11	47·0	8	18·0	6	10	...
X.		North Shields	1·36	— ·48	·35	25	14	49·0	10	21·0	20	19	21
,,		Borrowdale (Seathwaite).....	3·72	— 7·73	1·70	13	11	45·5	16	19·9	26	16	...
XI.	WALES.	Cardiff (Ely).....	1·90	— 1·76	·88	28	11	...	...	...	...	...	...
,,		Haverfordwest	2·61	— 1·84	·71	13	11	53·0	13	20·0	4	16	23
,,		Plinlimmon (Cwmsymlog) ...	2·14	...	·47	2	12	...	...	...	...	..	...
,,		Llandudno.....	1·70	— ·59	·85	13	11	50·0	12	25·4	26	12	...
XII.	SCOTLAND.	Cargen [Dumfries]	1·88	— 1·93	·56	13	13	44·8	13	14·8	5	17	...
,,		Jedburgh (Sunnyside).....	·68	— 1·08	...	...	...	46·0	12 *f*	17·0	5	19	...
XIV.		Douglas Castle (Newmains)	...	...	...	...	...	...	...	...	...	...	...
XV.		Lochgilphead (Kilmory)	2·55	— 1·84	·55	13	15	...	...	...	...	...	...
,,		Oban (Craigvarren)	2·67	...	·73	13	11	50·1	10	24·1	4	14	...
,,		Mull (Quinish).....	3·07	...	·79	12	12	...	...	...	...	...	...
XVI.		Loch Leven Sluices	1·50	— 1·46	·30	14 *g*	8	...	...	...	...	...	...
,,		Arbroath	1·50	— ·66	·24	19	14	46·0	9	21·0	20	15	...
XVII.		Braemar	1·46	— 1·21	·85	13	14	44·7	9	2·5	5	25	27
,,		Aberdeen	1·98	...	·27	13	20	49·0	10	23·0	5	20	...
XVIII		Lochbroom	2·11	...	·41	12	13	...	...	...	...	...	...
,,		Culloden	1·22	+ ·17	...	...	...	49·5	13	20·0	5	15	24
XIX.		Dunrobin	1·41	...	·27	14	13	53·0	9	26·5	1	16	...
,,		Kirkwall (Swanbister)..... ..	1·84	...	·30	24 *h*	22	47·8	9	22·5	25	11	...
XX.	IRELAND.	Cork (Blackrock)	4·02	— ·57	1·06	28	18	53·0	8	26·0	14	7	...
,,		Dromore Castle	5·64	...	1·12	22	17	58·0	9	28·0	14	...	...
,,		Waterford (Brook Lodge) ...	3·72	...	·78	22	18	49·5	10	21·5	5	5	16
,,		Killaloe	2·44	...	·57	6	14	53·0	9	26·0	15	10	...
XXI.		Carlow (Browne's Hill)	2·95	+ ·03	·53	14	15	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	1·98	— ·18	·52	28	15	53·4	8	27·3	5	4	18
XXII.		Ballinasloe	2·17	— ·34	·41	6	19	51·0	8	22·0	5	21	...
XXIII		Waringstown	2·37	+ ·12	·57	6	15	53·0	8	23·0	3	14	23
,,		Londonderry (Creggan Res.).	2·66	...	·44	21	18	...	...	...	...	...	...
,,		Omagh (Edenfel)	3·01	+ ·73	·70	6	14	49·0	9	20·0	4	19	22

And 9, 23. *b* And 14. *c* And 24. *d* And 26. *e* And 9, 27. *f* And 13. *g* And 19. *h* And 28.
+ Shows that the fall was above the average; —that it was below it.

METEOROLOGICAL NOTES ON FEBRUARY, 1886.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—The weather was favourable for agricultural operations, and the land was generally in good condition and friable, though at the commencement it was very wet, with R and S. Young wheat was none the worse for the long spell of wintry weather. No spring corn had been planted at the close of the month, but lambing was making good progress. S on 28th Primrose in flower on 4th, snowdrop on 8th.

HITCHEN.—The coldest February since 1855. The ice was safe for skating here from the New Year to the close of the month, with the exception of three days.

BANBURY.—A very cold and disagreeable month; mean temp. (34°·0) 4°·0 below the average. S on 2nd, 3rd, and 28th; fog on 6th, 10th, 11th, and 23rd; high wind on 14th and 28th.

CULFORD.—Scarcely any sunshine throughout the month, and N. and N.E. winds prevailed; S on 23rd and 27th.

COSSEY.—A very cold and dry month.

LANGTON HERRING.—The driest February for the last 12 years, the R being 2·37 in. below the average, and the coldest for 15 years, the mean temp. at 9 a.m. being 6°·7 below the average, and 1°·4 lower than that of the next coldest February, that of 1873; the highest min. temp. was only 41°·0, but the ground has not been covered with S so far this winter, and there have been no storms. Several days were misty, and there was an absence of sunshine. N.E. winds were very frequent, and except on the first three days of the month the pressure was high; it was misty on seven days, foggy on one.

BODMIN.—A dry and very cold month; mean temp. 39° 9.

STROUD.—A very cold backward month, the temp. falling as low as 25°·0 in shade on six days, besides the min. of 23°·0 on 6th. S on 22nd and 28th.

WOOLSTASTON.—A very cold month, the ground being frozen on all but two nights; mean temp. 33°·9. S on five days.

ORLETON.—A very cloudy, foggy, and gloomy month. with a steady, persistent frost, and a few fine days. The mean temp was 6°·8 below the average of 25 years, and lower than that of any February for more than 30 years. The ground was lightly covered with S at the beginning of the month, and a heavy fall occurred after 3 a m. on March 1st, covering the land to a depth of 5 inches by 9 a.m. Pressure was high and generally steady.

LEICESTER.—The month was very dry and exceedingly cold.

BOSTON.—The mean temp. was 6° 0 below the average, and the lowest since 1864. Pressure was usually high, and the winds calm.

KILLINGHOLME.—A month of real winter weather; frosts occurred nightly, and when the sun shone it was powerless against the polar wind; temp. reached 40°·0 on only four days. After the first two days pressure was high and steady.

ARNCLIFFE.—S on 20th, 22nd, and 28th.

NORTH SHIELDS.—S on ten days, fog on eight days

SEATHWAITE.—A fine but cold month, ushered in by a S storm and T on 1st; S fell on 6th, 22nd and 28th, and on the hills on 20th.

WALES.

HAVERFORDWEST.—A very wintry month, with several falls of S; severe frost with keen E. and S.E. winds prevailing from the 12th to the close. A heavy E.N.E. gale occurred on 12th, and a violent S E. gale on 28th, in which two vessels were lost, the one off St. David's Head, and the other on the north coast off Fishguard. This was accompanied by the heaviest S storm since January 18th, 1881, some of the drifts being 10 feet in depth, and had not the temp. very rapidly risen on March 1st, the roads would have been impassable.

LLANDUDNO.—The mean temp. of the month was no less than 4°·6 below the

average, and my record, which extends back to 1861 inclusive, shows no such low temp. except on two occasions, viz., 1873 and 1879, and in these cases the weather was much less changeable. The mean daily range (8°·7) and the total range (24°·6) were slightly below the average; the coldness of the weather was not caused by the intensity of the frost, but by a persistent and almost uninterrupted low temp. The ground was covered with S on the morning of the 14th, but it soon melted, and this was the only S that fell during the month. Up to 13th, the weather was cool, and on the whole pleasant, being characterized by a considerable amount of sunshine, the total duration being 55 hours. E. winds prevailed from 16th to 18th inclusive, and again from 23rd to the close.

SCOTLAND.

CARGEN.—A very dull foggy month, with the lowest mean temp. (34°·7) recorded in 26 years, being 5°·3 below the average. Fifty-three hours of sunshine were recorded, the average being 89 hours. Pressure was above the average. S on 5th, 19th, 25th and 28th.

JEDBURGH.—The weather was remarkably cold and ungenial throughout; vegetation was at a standstill and farmwork very far behind. Spring flowers, though above ground, did not develop, except the yellow aconite, and the birds were heard on only one day, the 10th. Pressure was much above the average.

OBAN.—The coldest and driest February known in recent years; there was comparatively little S, and not a single gale during the month, which is considered the worst in the year for gales. S on five days.

BRAEMAR.—A very cold cheerless month with only 41 hours of sunshine.

ABERDEEN.—Till 5th, N.W. winds were prevalent, thereafter S. breezes continued till 18th, when S.E. winds set in, accompanied by S and H showers; the weather was in consequence very cold and stormy; the R, however, was somewhat below the average. S, often mixed with H and sleet, on 13 days.

LOCHBROOM.—On the whole a good month, though cold; frost was very constant and intense; there was no S of any consequence on the low ground, but a thick covering on the hills.

CULLODEN.—A severe month, with occasional S; frost prevailed during the entire month, and in consequence all field labour as well as garden work was at a standstill.

SWANBISTER.—There was a remarkable absence of gales during the month, but showers of S or sleet fell on 12 days. The min. temp. was below 30° on 1st, 4th and 25th only; pressure was high from 4th to 10th, and 15th to 28th inclusive; steady S.E. winds prevailed from 19th to 28th; L on 1st; H on 19th and 23rd.

IRELAND.

DROMORE.—A very cold month, prevailing winds E.N.E.

WATERFORD.—There was much E. wind during the month, and much frost, though not very severe; S on Comeragh and Carlow mountains on 14th, S with E. wind on 28th, about six inches deep with great drifts.

KILLALOE.—The R was below the average, half the month having been dry and fine with low temp.; S and cold E. wind on 28th.

DUBLIN.—A cold month, February having only once been colder during the previous 20 years, namely in 1873, when the mean temp. was 37°·1, that of this month being 38°·9, 4°·0 below the average; the diurnal range of temp. was small on many occasions. Sleet or S fell on 14th, 27th and 28th; H on 1st, 25th, 27th and 28th. Solar halos on 12th, 13th and 15th; fog on 14 days, high winds on 5 days. Mean humidity, 86; mean amount of cloud, 7·3; prevailing winds S.E., S.W. and E.

EDENFEL.—A cold cheerless month, beginning and ending with S, and with frost on 22 nights; farm labour, however, was not much interrupted, and this locality seems to have suffered less than others more favourably situated. S on five days.